ARESE II / ARM-UAV S00 Deployment
February/March, 2000

Date	Flight Number	Take off/Landing time	Flight Duration	Comments
2/24/00	20000224A	1901Z/1:01pm CST T.O. 2205Z/4:05 pm CST Ldg.	50 minutes at 24 Kft 3 hrs 4 minutes total	Engineering flight. First time through preflight: 1 hr 33 min from start checklist to takeoff. Takeoff at 1901Z (1:01 pm CST). Twin Otter navigation instrument check (VOR approach at PNC) with payload installed and on; albedo passes over CART; "daisy" pattern over CART at 24 Kft; albedo passes over CART; return to Ponca City. 2014Z near 20 Kft, clear sky above with scattered clouds at 4-6 Kft over CART site. 2029Z starting first leg of daisy pattern. 2119Z finished with high altitude daisy pattern; descending for albedo flights over CART. Landing at Blackwell-Tonkawa Airport at 2205Z.
2/27/00	20000227A	1605Z/10:05 am CST T.O.	2 hr 2 min at 23 Kft 4 hrs 5 minutes total	First science flight. Virtually clear sky with only a few small patches of high stratus clouds to the southwest, three aircraft contrails over area at 1000, smoke blowing toward CART from brush burning to east of site. Takeoff at 10:05 am. Flight plan included two crossing passes over the CART central facility radiometer tower @ 500' AGL, followed by climb to 23,000 ft for repeated passes over the CART site on the "daisy" pattern. High altitude flight over CART was timed to coincide with the over flight of two satellites: Terra at 11:20 am CST and TRMM at 11:53 am CST. Twin Otter was on station at 23Kft for 22 minutes before first overflight and stayed on station 1 hour 3 minutes after the second overflights. Twin Otter landed at Ponca City Airport at about 2:10 pm CST.

3/1/00	20000301A	1634Z/10:34 am CST T.O. 1934Z/1:34 pm CST Ldg.	2 hr 27 min at 17 - 23 Kft 3 hr 0 min total	Second science flight. Takeoff at 10:34 am. Climb directly to 17,000 ft for first data leg, which ended at 23,000 ft. Altitude of subsequent legs varied between 23,000 ft and 17,000 ft depending on cloud conditions. Flew a 50 km leg NE (60°) centered over SF2. Turned and flew SW (240°) 50 km centered over the CART CF. Flight included 5 passes over SF2 and 4 passes over the CF. Flight terminated when oxygen supply ran low. Flight was timed to coincide with the over flight of the Terra satellite at 11:51 am CST. Twin Otter was on station and flying level 41 minutes before the satellite over flight and remained on station approximately 1 hour after. Twin Otter landed at Ponca City at 1:34 pm CST. The SPEC Learjet flew in situ the same pattern but the opposite direction from the Twin Otter. The ER-2 flew a similar pattern at 20 km altitude.
	20000301B	2130Z/3:30 pm CST T.O. 2321Z/5:21 pm CST Ldg.	~1 hr 20 min at 17 Kft 1 hr 51 min total	Third Science Flight. Improving cloud conditions prompted the return of the Twin Otter and Lear for another flight in the afternoon. Same flight path was flown as earlier, at 17 Kft. Flight terminated after a payload anomaly during the fifth data leg.

3/3/00	20000303A	1656Z/10:56 am CST T.O. 2043Z/2:43 pm CST Ldg.	2 hr 16 min at 18 - 23 Kft 3 hr 47 min total	Fourth Science Flight. This was the first ARESE II cloudy sky mission. Climb directly to 18 Kft before beginning data legs. On station prior to the Terra satellite over crossing. Fifteen complete legs of the lopsided daisy pattern were flown at altitude, primarily at 23 Kft. Each leg is 14 miles long and crosses the CF, with longer legs extending into the "radar triangle" formed by the CF, SF2 and BT. At the end of the flight, two albedo crossings of the CF were made at 500 ft AGL. The ER-2 was flying a racetrack pattern at high altitude, while the Citation did in situ profiling of the stratus layer. After climbing to the cloud tops, it spiraled downward over the CF, SF1 and SF2 sites. This was followed by a 50 km turbulence run upwind, returning along the cloud tops.
3/5/00	20000305A	1632Z/10:32 am CST T.O. 2010Z/2:10 pm CST Ldg.	1 hr 55 min at 17 - 23 Kft 3 hr 38 min total	Fifth Science Flight. This was an ARESE II clear sky mission. After doing albedo runs over the CART site, the Twin Otter ascended to 19 Kft and was on station prior to the Terra satellite over crossing. Scattered cirrus covered the region during most of the flight. The modified daisy pattern was flown at altitudes varying from 16 to 19 Kft, depending on cloud conditions. The albedo runs were repeated at the end of the flight, again under clear conditions. A total of 15 data runs were completed.

3/9/00	20000309A	2102Z/3:02 pm CST T.O. 2355Z/5:55 pm CST Ldg.	2 hr 11 min at 17 Kft 2 hr 53 min total	Sixth Science Flight. This Cloud IOP flight was scheduled and planned during the day as the clouds developed unexpectedly. After climbing to 17 Kft, the Twin Otter flew Experiment #2. Straight legs fifty km long were centered over the CF and aligned with the wind direction. Legs flown into the wind (250 degrees) lasted about 21 minutes. The other direction took about 9 minutes. The Cessna Citation was flying 100 km legs in the same direction but at a higher altitude.
3/10/00	20000310B	1712Z/11:12 am CST T.O. 2010Z/2:10 pm CST ldg.	2 hr 29 min at 7 Kft 2 hr 58 min total	Seventh Science Flight. During flight preparations, this was switched from an ARESE mission to a Cloud IOP mission. The cloud radar was turned upward. Legs ten miles in length were flown normal to the wind direction. Five legs were flown, each separated by 2.5 miles, centered over the CF and radar triangle area. Flights were vectored along 165 and 345 degrees. Most flights were at 7 Kft, while the later flights were at 6 Kft as the clouds descended. Cloud decks were located at 11 and 15 Kft, but at times they merged into a single layer. The Cessna Citation did in situ profiling. The Twin Otter was on station 25 minutes before a Terra satellite over crossing at 1745Z.

3/17/00	20000317A	1739Z/11:39 am CST T.O. 2004Z/2:04 pm CST ldg.	1 hr 24 min at 23 kft 3 hr 25 min total	Eighth science flight. Friday brought low ceilings with rain, icing from the freezing level to clouds tops, high altitude buildups south of the CART area (with cloud tops reported from 20,000 ft to 35,000 ft) moving north. During the preflight, it was clear that the conditions below the overcast would prevent accomplishing the albedo runs before climbing to altitude. However, it appeared that conditions might allow getting above the clouds over the CART site. Therefore, we ran through the checklist with the option of holding or canceling if conditions did not improve. The Twin Otter took off at 10:39 am CST and climbed through the overcast with acceptable icing during climb and broke into the clear at about 15 kft. During climb, the Twin Otter accomplished 3 legs of the "daisy" pattern above the clouds and reached 23 kft about 22 minutes before the Terra overcrossing. The Twin Otter happened to be almost exactly over the CART CF at 11:52 am CST overcrossing. The Citation supporting the IOP took off at about 11:30 am CST and performed vertical profiling over the CART site while the Twin Otter was flying the"daisy" pattern. Around solar noon, the Citation flight crew reported low cloud layers at 5.5 kft, 6 kft, and 9 kft and the Twin Otter reported a thin cirrus layer above their altitude. The Twin Otter conducted 11 level flight legs at 23 kft before descent for the albedo legs at approximately 500 ft agl. Landing was at about 2004Z (2:04 pm CST).

3/18/00	20000318A	1615Z/10:15 am CST T.O. 1800Z/12:00 pm CST ldg.	24 min at 23 kft 1 hour 45 min total	The ceilings were quite low with limited visibility early on Saturday. Ponca City airport was reporting 200 ft ceiling and 0.75 mile visibility at 6:00 am with gradual improvement predicted later in the morning. These conditions prevented bringing the Twin Otter to Blackwell-Tonkawa Airport for the preflight. However, conditions in the area did allow a direct departure from Ponca City starting about 10:00 am. We performed the preflight checklist at the Ponca City airport with the Mission Controller and Ground Crew in cell phone contact with the PGS at the Blackwell-Tonkawa Airport. In part due to wet conditions, the payload ground station was able to acquire the Twin Otter signal on the ground at the Ponca City airport. There was concern about another trough moving into the area later in the day that could bring a return of lower ceilings and visibility. Takeoff was at about 10:15 am CST with direct climb to 23 kft at 11:09 am CST. The cloud layer was uniform without substantial layering up to the cloud tops at about 11.4 kft. There was some ice accumulation at the cloud top altitude just prior to entering clear air. The Twin Otter completed 3 legs of the daisy pattern above the clouds during climb (about 30 minutes) and 3 level data legs at 23 kft (about 24 minutes) before a hydraulic problem on the Twin Otter forced an early return to Ponca City Airport for landing at about 12:00 pm. Total flight time was 1 hour 45 minutes. The cloud layer was uniform without layering on climb. The Twin Otter will require maintenance before it will be ready for flight; therefore, flight on Sunday will not be possible.

3/20/00	20000320A	1625Z/10:25 am CST T.O. 1957Z/1:57 pm CST ldg.	1 hr 54 min @ 23kft 3 hr 31 min total	Morning was clear and cold with some surface haze; brought the Twin Otter to Blackwell-Tonkawa in preparation for a clear sky flight. Takeoff was at 10:25 am CST (1625Z). Some mid-level clouds appeared at a significant distance to the northwest and north of the CART site around 11:00 am (1700Z). The Twin Otter completed two albedo runs over the CART site and then climbed to 23 kft along legs of the "daisy" pattern. Around noon, the clouds to the northwest continued to move to the north, away from the CART area. After reaching 23 kft, the Twin Otter completed 16 data legs on the "daisy" pattern and then descended for another albedo run over the CART site at 500 ft agl. Landing at Ponca City Airport was at 1:57 pm (1957Z) for a total flight time of 3 hours 31 minutes and 1 hour 54 minutes in level flight at 23 kft. There were no clouds visible in the sky by landing time. The zenith TDDR shadow ring stopped moving during the flight (1836Z). It appears that the motor failed; it will be replaced before the next flight. Aft lower radiometer dome appears to have water inside of the dome. This is the CM-22 and photos were taken of the condition of the dome.

3/21/00	20000321A	1605Z/10:05 am CST T.O. 1940Z/1:40 pm CST ldg.	2 hr 7 min @ 23 Kft 3 hr 34 min total	Today we completed a modified daisy pattern mission above a slowly varying stratiform cloud layer as the the UND Citation sampled the cloud microphysics. All instrumentation appeared to function normally. The Otter spent about 2 hrs and 6 minutes at 23 kft followed by an albedo run in the vicinity of the CART site. On ascent, the cloud layer was situated between about 3.2 and 10.5 kft. During the flight the layer thinned, with the bases observed at about 7.3 kft when the Otter descended through the clouds at the end of the flight. The thinning was noticeable in the IR satellite pictures. The skies remained overcast throughout. Takeoff was skewed relative to local noon in order to avoid an approaching thick cirrus deck. Time on station was from about 16:44 to 18:51 CST. Local noon is about 18:35. The first set of albedo runs was discarded to allow more time at altitude. The clouds on this mission appear to have had more structure than on previous flights. Small cirrus patches may have drifted by at different times.
3/29/00	20000329A	1300Z/12:00 am CST T.O.		18:?? Cloud tops at 8400'; 13:28 Some light wispy cirrus reported